

**Request to Archive
With The National Centers for Environmental Information
For NGDC Geomagnetism Data Sources and Products
Provided by NGDC>MGG**

2014-02-20

This information will be used by NCEI to conduct an appraisal and make a decision on the request.

1. Who is the primary point of contact for this request?

Brian Meyer
NGDC>MGG
Geomagnetic Data Manager
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2. Name the organization or group responsible for creating the dataset.

DOC/NOAA/NESDIS/NGDC > National Geophysical Data Center, NESDIS, NOAA, U.S. Department of Commerce

3. Provide an overview summarizing the scope of data you want to archive. Describe the outputs, data variables, including their measurement resolution and coverage.

NGDC ingests, describes, stewards, and develops models / products from marine, ground-based, airborne, and satellite magnetic observing platforms. The World Magnetic Model (WMM) developed by NGDC from these data is the DoD and NATO standard model for navigation and is the NOAA and FAA model used for nautical and aeronautical charting. The model is also embedded into nearly all GPS units and cell phones as well as many cameras, watches, and mapping applications that display or determine bearing or which way is "north". NGDC's 200+ year history in modeling magnetic field is essential for updating surveys based on magnetic compass.

The data to be archived will consist of various geophysical data, models and calculators. These products are used to represent the Earth's magnetic field over its entire surface, as well as modeling how it changes over time. The World Magnetic Model (WMM), Enhanced Magnetic Model (EMM), and High Definition Geomagnetic Model (HDGM), International Geomagnetic Reference Field (IGRF) are global geomagnetic data models that are produced once every 5 years (HDGM is annual). The United States Historical Declination Calculator (USHD) and the GUFM1 are historic geomagnetic models that are appropriate for navigational and positional corrections for data before modern magnetic observations.

The IGRF is an international standard for magnetic field modelling. It is created by the International Association of Geomagnetism and Aeronomy (IAGA). NGDC is the host for the main IAGA webpage, and are a key distributor of the model. The current version is the 11th version of IGRF, and was produced in 2010 and has a health of 5 years.

The US Historic Declination calculator, in combination with the GUFM, is used to settle historic boundary disputes and is important to maintain for consistent historic positioning. The USHD spans from 1750 to the present, and only has coverage for the conterminous US. The GUFM is a global model that models the magnetic field from 1590-1990 using historic observations.

The WMM is a spherical harmonic representation to degree and order 12, resolving the magnetic field at 3000km

resolution. The World Magnetic Model is a joint product of the United States National Geospatial-Intelligence Agency (NGA) and the United Kingdoms Defence Geographic Centre (DGC). The WMM was developed jointly by the National Geophysical Data Center (NGDC, Boulder CO, USA) and the British Geological Survey (BGS, Edinburgh, Scotland). This model is the standard model used by the U.S. Department of Defense, the U.K. Ministry of Defence, the North Atlantic Treaty Organization (NATO) and the International Hydrographic Organization (IHO), for navigation, attitude and heading referencing systems. It is also used extensively by civilian navigation and heading systems. The WMM is developed using only satellite magnetometer data, and represents the magnetic field produced by the Earth's core. The scope of this model runs from 2010-2015, when the next WMM is to be released.

The EMM extends to degree and order 720, resolving magnetic anomalies down to 56km wavelength. The higher resolution results in significantly improved pointing accuracy. The EMM was compiled from satellite, marine, aeromagnetic, and ground magnetic surveys and observations. The EMM is applicable to the time period between 2010-2015.

The HDGM is a model designed for use by directional drillers in order to orient the drill bit below the surface. The model includes the Main Field, Secular variation, the crustal field to degree 720, and a basic model of the external field. The HDGM is a product that is only available via purchase. The HDGM is produced annually and only has a 1 year scope.

4. What is the time period covered by the dataset? (YYYY-MM-DD, YYYY-MM or YYYY)

From 1750-01-01

Ongoing as continuous updates to the data record

5. Edition or version number(s) of the dataset:

6. Describe the level to which the data are processed. For example, are these unprocessed raw observations, derived parameters, quality controlled or inter-calibrated data, etc.?

Trackline and observatory data is quality controlled for obvious erroneous data and baseline errors. The satellite data is processed for orbit positions and instrument error/bias. Data process steps will further be defined within the metadata of each dataset/model.

7. Approximate date when the dataset was or will be released to the public:

2009

8. Who are the expected users of the archived data? How will the archived data be used?

The global magnetic map is useful in science education to illustrate various aspects of Earth evolution such as plate tectonics and crustal interaction with the deep mantle. Geophysical magnetic models and calculators are also used for accurate navigation and positioning on or near the Earth's surface, past, present, and future by scientists, military, and citizens alike.

9. Has the dataset undergone user evaluation and/or an independent review process? Did NCEI participate in design reviews?

Most, if not all, of the models to be submitted have been used by various academic, governmental, and public institutions and/or have gone through scientific peer review with publication of associated papers. All models go through extensive in-house testing and debugging before release to the public.

10. Describe the dataset's relationship to other archived datasets, such as earlier versions or related source data. If this is a new version, how does it improve upon the previous version(s)?

These models/calculators make use of archived grids, satellite data, and trackline data.

11. List the input datasets and ancillary information used to produce the data.

All archived marine and aeromagnetic trackline data archived in GEODAS up to publication date. CHAMP, Oersted, and DMSP satellite data. Regional grids where original trackline/observatory data is unavailable.

12. List web pages and other links that provide information on the data.

ISO standard metadata is available for this dataset. The metadata does not describe the individual data contributors. The published article associated with the dataset is provided with the data as a PDF. This article describes the institutions that provided data and how the model was assembled from that data.

13. List the kinds of documents, metadata and code that are available for archiving. For example, data format specifications, user guides, algorithm documentation, metadata compliant with a standard such as ISO 19115, source code, platform/instrument metadata, data/process flow diagrams, etc.

1. <http://geomag.org/models/index.html>
2. http://www.ngdc.noaa.gov/metadata/published/NOAA/NESDIS/NGDC/MGG/Geophysical_Models/iso/
3. <http://ngdc.noaa.gov/geomag/geomag.shtml>
4. <http://www.epm.geophys.ethz.ch/~cfinlay/gufm1/Jacksonetal2000.pdf>
5. http://www.ngdc.noaa.gov/geomag/WMM/data/WMM2010/WMM2010_Report.pdf
6. <http://info.geomag.us/Smaus/Doc/ngdc720.pdf>

14. Indicate the data file format(s).

1. GeoTIFF
2. netCDF-4
3. KMZ
4. PDF
5. XYZ
6. TXT/CSV/COF

15. Are the data files compressed?

No

16. Provide details on how the files are named and how they are organized (e.g., file_name_pattern_YYYYMM.tar in monthly aggregations).

Model_year.tar

17. Explain how to access sample data files and/or a file listing for previewing. If it is not available now, when will it be available?

Visiting <http://geomag.org/models/index.html> allows for previewing the different files/formats available for data download/description.

18. What is the total data volume to be submitted?

Historic Data: all historic data or data submitted as a completed collection.

Total Data Volume: 228MB

Number of Data Files: 1

19. Are later updates, revisions or replacement files anticipated? If so, explain the conditions for submitting these additional data to the archive.

NGDC regularly receives new trackline data, marine and aeromagnetic, from data source institutions. These new tracklines are then incorporated into the the GEODAS system and are used for creating a higher density and more accurate magnetic anomaly maps in the future. Magnetic observatory data is collected continuously around the globe, and this data is used to update the geomagnetic reference models over time. As new satellites are launched (SWARM) and older satellite data is being exploited (DMSP) we will be able to build new models and update older versions.

20. Describe the server that will connect to the ingest server at NCEI for submitting the data.

Physical Location: 325 Broadway, DSRC, Boulder, CO 80305

System Name: Brian Meyer

System Owner: NGDC>MGG

Additional Information: Add comments as needed on applicable data types, etc.

21. What are the possible methods for submitting the data to NCEI? Select all that apply.

1. FTP PULL

2. FTP PUSH

3. Physical Media Delivery

Internet Download

22. Identify how you would like NCEI to distribute the data. Web access support depends on the resources available for the dataset.

1. User interface to order and stage data for download

2. Direct download links

23. Will there be any distribution, usage, or other restrictions that apply to the data in the archive?

No known constraints apply to the data.

24. Discuss the rationale for archiving the dataset and the anticipated benefits. Mention any risks associated with not archiving the dataset at NCEI.

When some magnetic models are updated, such as the IGRF, they include the older versions of the model within them, but the models have been updated, so obtaining original values used to calculate residual magnetic values can be difficult, if possible. Archiving these models will allow for more accurate data/lineage recreation and accuracy. Also, having access to older versions of models can aid in the creation of newer and more accurate models by limiting the amount of time needed to recreate base efforts and procedures. To recreate past working conditions so that efforts may be duplicated accurately, and errors appropriately identified.

25. Are the data archived at another facility or are there plans to do so? Please explain.

No

26. Is there an existing agreement or requirement driving this request to archive? Have you already contacted someone at NCEI?

No

27. Do you have a data management plan for your data?

No

28. Have funds been allocated to archive the data at NCEI?

This process takes place completely within NGDC, so no further funding should be necessary.

29. Identify the affiliated research project, its sponsor, and any project/grant ID as applicable.

Theses models are direct products of effort from Cooperative Institute for Research in Environmental Sciences (CIRES) faculty and funding through their work at the National Geophysical Data Center (NGDC). Much of the funding for theses models is provided by the National Geospatial-Intelligence Agency (NGA) for use by the DOD and other federal programs.

30. Is there a desired deadline for NCEI to archive and provide access to the data?

Archive by: 2015-03-01

Accessible by:

31. Add any other pertinent information for this request.

None